

# Binomial Theorem WS Odd

$$1) (x-5y)^8 \rightarrow (x+(-5y))^8$$

$$\text{1st } {}_8C_0 x^8 (-5y)^0 = (1) x^8 (1) = x^8$$

$$\text{2nd } {}_8C_1 x^7 (-5y)^1 = (8) x^7 (-5y) = -40 x^7 y$$

$$\text{3rd } {}_8C_2 x^6 (-5y)^2 = (28) x^6 (25y^2) = 700 x^6 y^2$$

$$\text{4th } {}_8C_3 x^5 (-5y)^3 = (56) x^5 (-125y^3) = -7000 x^5 y^3$$

$$\text{5th } {}_8C_4 x^4 (-5y)^4 = (70) x^4 (625y^4) = 43750 x^4 y^4$$

$$\text{6th } {}_8C_5 x^3 (-5y)^5 = (56) x^3 (-1325y^5) = -74200 x^3 y^5$$

$$\text{7th } {}_8C_6 x^2 (-5y)^6 = (28) x^2 (15625y^6) = 437500 x^2 y^6$$

$$\text{8th } {}_8C_7 x^1 (-5y)^7 = (8) x^1 (-78125y^7) = -625000 x y^7$$

$$\text{9th } {}_8C_8 x^0 (-5y)^8 = (1) (1) (390625y^8) = 390625 y^8$$

$$x^8 - 40x^7y + 700x^6y^2 - 7000x^5y^3 + 43750x^4y^4 - 74200x^3y^5 + 437500x^2y^6 - 625000xy^7 + 390625y^8$$

$$3) (x-y)^4 \rightarrow (x+(-y))^4$$

$$\text{1st } {}_4C_0 x^4 (-y)^0 = (1) x^4 (1) = x^4$$

$$\text{2nd } {}_4C_1 x^3 (-y)^1 = (4) x^3 (-1)y = -4x^3y$$

$$\text{3rd } {}_4C_2 x^2 (-y)^2 = (6) x^2 y^2 = 6x^2y^2$$

$$\text{4th } {}_4C_3 x^1 (-y)^3 = (4) x (-1)y^3 = -4xy^3$$

$$\text{5th } {}_4C_4 x^0 (-y)^4 = (1) (1) y^4 = y^4$$

$$x^4 - 4x^3y + 6x^2y^2 - 4xy^3 + y^4$$

$$5) (2x+3y)^3$$

$$\begin{aligned} \text{1st} & \quad {}_3C_0 (2x)^3 (3y)^0 = (1) (8x^3) (1) = 8x^3 \\ \text{2nd} & \quad {}_3C_1 (2x)^2 (3y)^1 = (3) (4x^2) (3y) = 36x^2y \\ \text{3rd} & \quad {}_3C_2 (2x)^1 (3y)^2 = (3) (2x) (9y^2) = 54xy^2 \\ \text{4th} & \quad {}_3C_3 (2x)^0 (3y)^3 = (1) (1) (27y^3) = 27y^3 \end{aligned}$$

$$8x^3 + 36x^2y + 54xy^2 + 27y^3$$

$$7) (x-2)^5 \rightarrow (x+(-2))^5$$

$$\begin{aligned} \text{1st} & \quad {}_5C_0 x^5 (-2)^0 = (1) x^5 (1) = x^5 \\ \text{2nd} & \quad {}_5C_1 x^4 (-2)^1 = (5) x^4 (-2) = -10x^4 \\ \text{3rd} & \quad {}_5C_2 x^3 (-2)^2 = (10) x^3 (4) = 40x^3 \\ \text{4th} & \quad {}_5C_3 x^2 (-2)^3 = (10) x^2 (-8) = -80x^2 \\ \text{5th} & \quad {}_5C_4 x^1 (-2)^4 = (5) x^1 (16) = 80x \\ \text{6th} & \quad {}_5C_5 x^0 (-2)^5 = (1) (1) (-32) = -32 \end{aligned}$$

$$x^5 - 10x^4 + 40x^3 - 80x^2 + 80x - 32$$

$$9) (x+3)^9$$

$$n=9 \quad r=2-1=1$$

$$\begin{aligned} \text{2nd} & \quad {}_9C_1 x^8 (3)^1 \\ & \quad = (9) x^8 (3) \\ & \quad = 27x^8 \end{aligned}$$

$$11) (r+s)^9$$

$$n=9 \quad r=4-1=3$$

$$\begin{aligned} \text{4th} & \quad {}_9C_3 r^6 s^3 \\ & \quad = 84 r^6 s^3 \end{aligned}$$

$$13) (x+4)^8$$

$$n=8 \quad r=5-1=4$$

$$\begin{aligned} \text{5th} & \quad {}_8C_4 x^4 (4)^4 \\ & \quad = (70) x^4 (256) \\ & \quad = 17920x^4 \end{aligned}$$